

*Original report*

***Comparisons of Masticatory Movements while Wearing Complete Mandibular Dentures with and without Suction in a Totally Edentulous Subject***

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## Comparisons of Masticatory Movements while Wearing Complete Mandibular Dentures with and without Suction in a Totally Edentulous Subject

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The same edentulous subject was allowed to wear both complete mandibular dentures with and without suction to compare the differences in masticatory movements that were measured with the Gnatho-Hexagraph II, a device for measuring mandibular movement.

The following improvements were shown in all chewing patterns of right-lateral and left-lateral chewing and free chewing while wearing the complete mandibular dentures with suction compared to wearing dentures without suction.

- 1) Reduction in mouth opening-closing time
- 2) Increase in the range of mouth opening
- 3) Improvement in chewing rate
- 4) Improvement in stability of chewing rhythm

The values measured were closer to those of masticatory movements in healthy dentulous persons. Thus, the masticatory movements while wearing the complete mandibular dentures with suction seemed to be physiologically and efficiently executed.

Key words: complete mandibular dentures with suction, masticatory movement, Gnatho-Hexagraph II

### I. Introduction

As we know from history of constructing complete dentures, rivalries and trials have been repeated to test techniques in order to reach goals so that a maxillary denture should not drop with suction effect, that a mandibular denture would be used for stable mastication even though suction is incomplete, and that a denture would not cause any pain to work<sup>1)</sup>. Current understanding might almost confirm that those goals are nearly met with thanks to efforts of our forerunners who advanced to develop new materials, theories and techniques.

In this regard, next future attention will be on the issue of the

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complete mandibular denture suction.

Reasons for difficult stability of the lower denture might be, in addition to its limited denture bearing area of residual ridge<sup>2,3)</sup>, remarkable tongue mobility in the mouth, and extensively mobile mucobuccal fold during the course of mouth opening-closing which is said to become 2–3 times larger than that of maxillary jaw<sup>4)</sup>.

In 1999, Abe presented that the denture base suction of the complete mandibular denture would be achieved equally like that of maxillary denture, when the denture base border could be totally sealed with the mobile soft tissues. And he rationalized and published on the suction mechanism of the complete mandibular denture for the first time in the profession over the world<sup>5)</sup>. This clinical technique has been introduced via various media of information since then and has been going popular



Fig.1 Subject A (Healthy dentulous subject) and Subject B (Edentulous patient).

nationwide presently<sup>6-10)</sup>. In practice, if a complete denture is constructed accordingly as based on this theory, the suction will become certainly effective in many cases of lower complete dentures. And also because patients' responses to wearing are commonly favorable, the complete mandibular denture suction can be used as well like in practice of a maxillary denture in order to reduce denture mobility and to prevent the denture from dislodging or toppling. But it is admitted, however, that no scientific reports have been made to confirm this effectiveness.

Thus, the aim of this study was to verify favorable wearing responses of mastication objectively and to compare the differences of masticatory movements of same patient wearing a complete mandibular denture respectively with suction or without suction with the aid of a diagnosing device of three dimensional 6 degrees of freedom jaw movement analysis. And interesting results will be reported here.

### II. Research Method and Materials

#### 1. Subjects and Test food (Fig.1-3)

**Subject A:** A healthy dentulous female subject exhibiting no abnormal temporomandibular joints from clinical and radiographic views. Age of 22 years and established as control (Hereafter called as C).

Macroscopic observation reveals straight and smooth traces of frontal plane jaw opening and closing pathways<sup>11)</sup>. Radiographic view confirms no problems on the head of mandible position within the TMJ fossa or its form, or right and left jaw movement synchronism and its range of motion<sup>12,13)</sup>.

**Subject B:** A maxillo-mandibular edentulous male



Fig.2 Intraoral photographs of Subject A and B.

subject likewise exhibited no abnormal temporomandibular joints from clinical and radiographic views. Age of 81 years, and showed slightly better than medium degree of residual ridge condition on both jaws.

**Test food:** Cubical pieces of fish sausage in size of about 1cm on a side.

#### 2. Method of Masticatory movement

Both subjects were instructed to chew the test pieces in three different patterns of chewing such as the right-lateral chewing, the left-lateral chewing and the free chewing. Cycles of motion were tried in 10 strokes each for the right-lateral and the left-lateral, and in 20 strokes for the free chewing.

As for the subject B, these strokes were tested in wearing both complete mandibular dentures without suction (hereafter called as D1) and with suction (hereafter called as D2) (Fig.4). Opposing complete maxillary dentures are confirmed effective with suction when tested respectively.

#### 3. Masticatory movement pathways and velocity measurements

With the help of the mandibular jaw movement measuring-device, Gnatho-Hexagraph II (G-C Corp), three dimensional 6 degrees of freedom movement pathways and velocity measurements were determined.

A stereo camera system assembled with two high speed CCD cameras was organized to take an LED photographing (light-emitting diode) joined with a subject head (head frame) and a mandibular jaw (facebow). Then an exclusive high-speed image

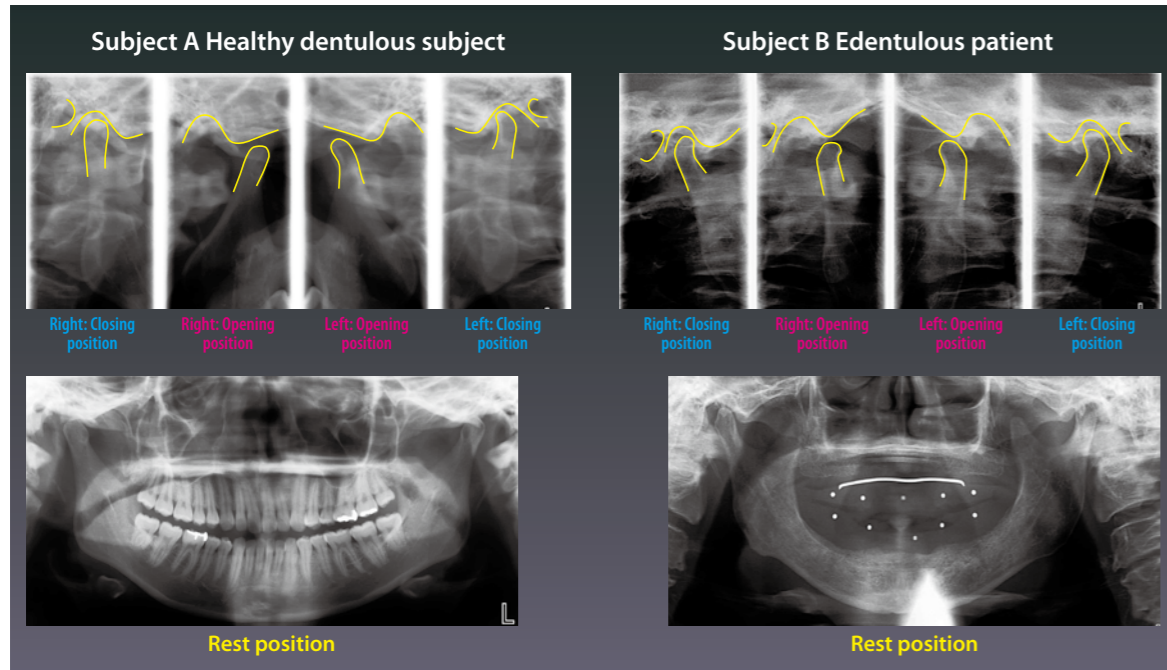


Fig.3 Radiographic views. No abnormalities were confirmed in the temporomandibular joints.

processing unit incorporated within the stereo camera system employed the stereo image processing including the processed corresponding points on the basis of actual time. And processed data of relative motion of mandibular jaw against maxillary jaw were computed.

Each head frame and facebow has three LED lights at prescribed positions. As for the subject B, the facebow was attached to the complete mandibular denture.

4. Measurement items and method of analysis

1) Time factors

- (1) Mouth opening-closing time
- (2) Mouth opening time
- (3) Mouth closing time
- (4) Occlusion time

2) Mandibular jaw movement pathways

- (1) Magnitude of mouth opening at maximal opening point

3) Mandibular jaw movement velocity

- (1) Maximal velocity at mouth opening
- (2) Maximal velocity at mouth closing

In this analysis the first stroke sequence of measurement was excluded because it likely permitted errors. Mean values of individual strokes were calculated from measurement items and were comparatively studied.

4) Masticatory rhythm and masticatory pattern

III. Research results (Fig5, Table1)

1. Time factors

As for the mouth opening-closing time, the results were obtained in the order of C<D2<D1. For details, D2 showed shorter duration than D1 in almost all cases of factors, but only in the case of the right-lateral and free chewing time, results were reverse.

1) Mouth opening-closing time

All patterns of chewing	C<D2<D1
2) Mouth opening time	Right-lateral chewing C<D2<D1
Left-lateral chewing	D2<D1<C
Free chewing	C<D2<D1
3) Mouth closing time	Right-lateral chewing D2<C<D1
Left-lateral chewing	C<D2<D1
Free chewing	C<D2<D1
4) Occlusion time	Right-lateral chewing D1<C<D2
Left-lateral chewing	C<D2<D1
Free chewing	C<D1<D2

2. Mandibular jaw movement pathways

Larger distance of traces exhibited in all cases of chewing with D2 in comparison with D1.

1) Magnitude of mouth opening at maximal opening point

Right-lateral chewing	C<D2<D1
Left-lateral chewing	C<D2<D1
Free chewing	D2<C<D1



Fig.4 Tested complete mandibular dentures of Subject B.

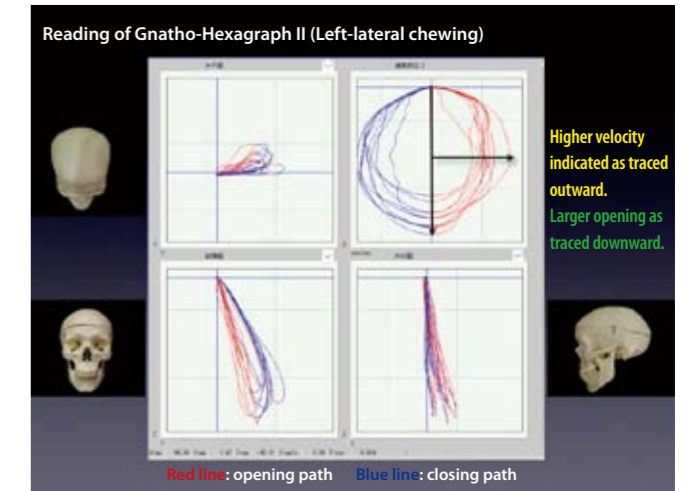


Fig.5-1 Subject A (Dentulous healthy subject) indicated [C], Of Subject B (Edentulous patient), Wearing the complete mandibular denture without suction [D1] and with suction [D2].

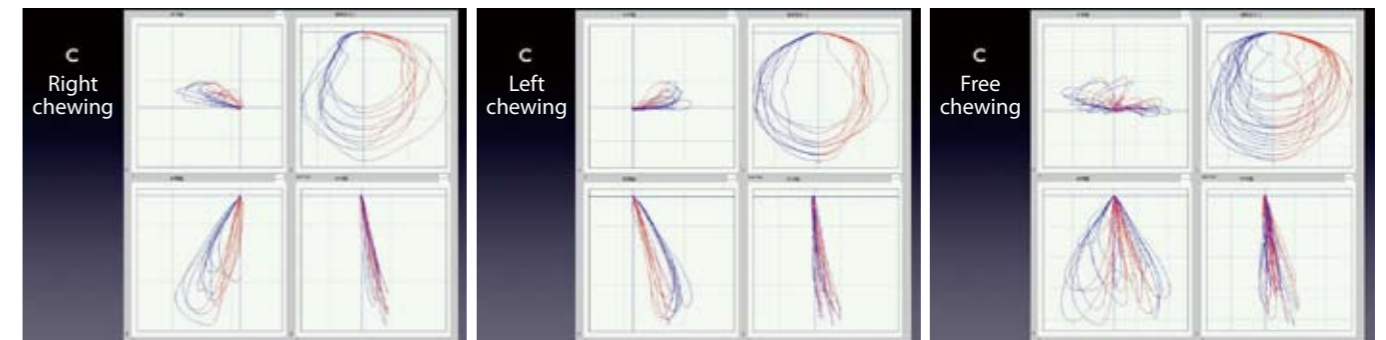


Fig.5-2 Subject A (Dentulous healthy subject).

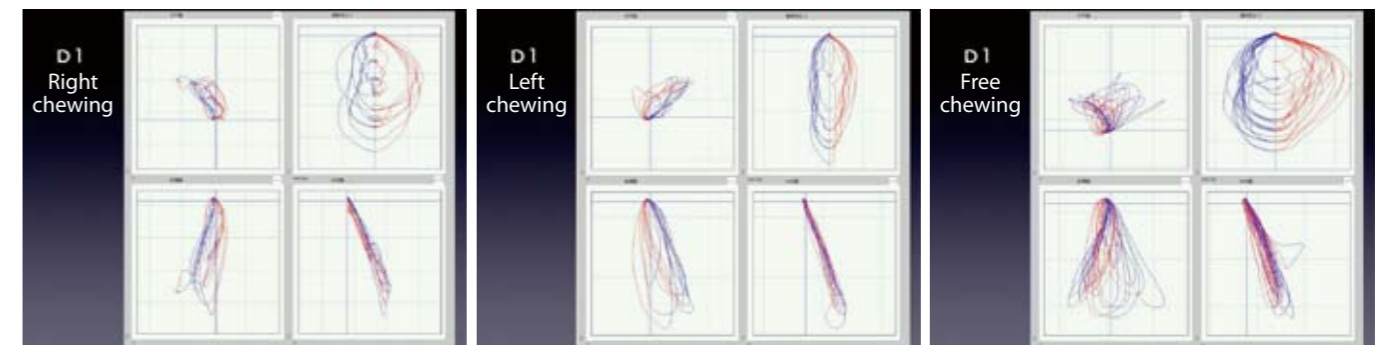


Fig.5-3 Subject B (Edentulous patient) Complete mandibular denture without suction.

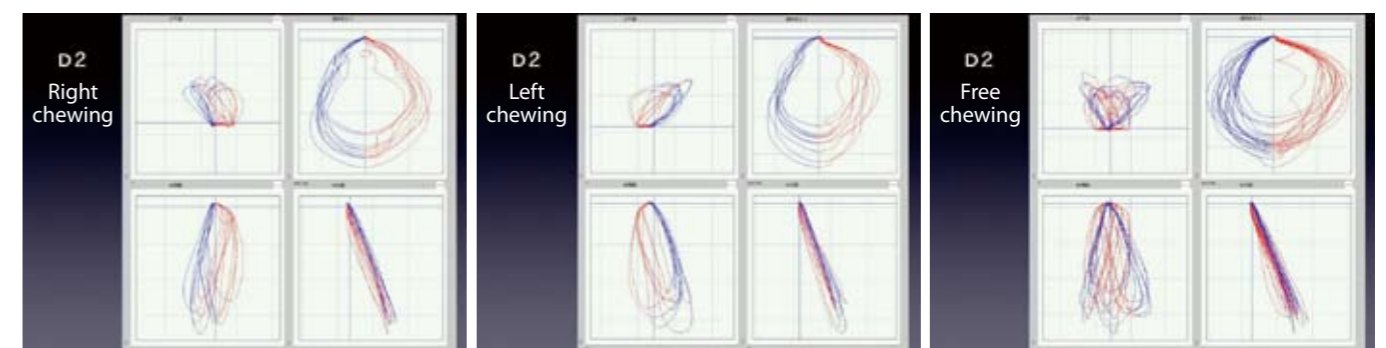


Fig.5-4 Subject B (Edentulous patient) Complete mandibular denture with suction.

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.838	0.146	0.383	0.308	113.501	93.125	18.784
2	0.704	0.238	0.175	0.292	119.261	79.896	14.354
3	0.704	0.292	0.192	0.221	91.625	85.463	14.306
4	0.633	0.192	0.179	0.263	113.132	73.701	15.264
5	0.625	0.167	0.217	0.242	100.365	96.807	18.023
6	0.708	0.246	0.208	0.254	114.134	90.962	18.088
7	0.75	0.246	0.196	0.308	180.938	129.95	23.238
8	0.804	0.329	0.213	0.263	146.278	135.599	21.947
9	0.679	0.175	0.221	0.283	111.573	91.86	19.497
10	1.121	0.492	0.292	0.338	143.368	97.436	21.567
Ave (2-10)	0.748 (sec)	0.264 (sec)	0.210 (sec)	0.274 (sec)	124.519 (mm/sec)	97.964 (mm/sec)	18.476 (mm)

**Table 1-1 Movement analysis of mouth opening-closing.**  
Subject A, Dentulous healthy subject  
Name: C  
Data classification: Right chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.842	0.15	0.367	0.325	119.198	82.268	20.631
2	0.667	0.188	0.233	0.246	114.22	122.054	20.934
3	0.675	0.175	0.258	0.242	123.867	140.947	22.843
4	0.746	0.233	0.271	0.242	88.873	108.47	19.6
5	0.588	0.179	0.221	0.188	99.948	133.425	17.654
6	0.708	0.246	0.246	0.217	102.672	131.41	18.082
7	0.671	0.196	0.217	0.258	157.966	127.938	21.956
8	0.758	0.313	0.246	0.2	113.457	141.031	20.877
9	0.717	0.233	0.267	0.217	104.946	147.664	21.565
10	0.808	0.333	0.258	0.217	109.11	141.936	21.05
Ave (2-10)	0.704 (sec)	0.233 (sec)	0.246 (sec)	0.225 (sec)	112.784 (mm/sec)	132.764 (mm/sec)	20.507 (mm)

**Table 1-2 Movement analysis of mouth opening-closing.**  
Subject A, Dentulous healthy subject  
Name: C  
Data classification: Left chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.671	0.071	0.383	0.217	90.768	144.345	21.503
2	0.55	0.167	0.167	0.217	148.807	106.86	18.592
3	0.596	0.221	0.163	0.213	165.362	119.8	19.319
4	0.658	0.267	0.171	0.221	110.101	82.813	14.907
5	0.567	0.117	0.175	0.275	128.281	88.252	16.516
6	0.604	0.158	0.192	0.254	173.556	119.809	21.46
7	0.75	0.163	0.158	0.429	140.534	58.203	15.228
8	0.55	0.258	0.138	0.154	170.661	141.654	18.051
9	0.608	0.171	0.217	0.221	128.575	130.619	20.873
10	0.633	0.2	0.183	0.25	143.497	106.807	18.353
11	0.6	0.171	0.238	0.192	110.435	139.566	19.756
12	0.642	0.229	0.175	0.238	146.787	97.817	17.755
13	0.658	0.388	0.108	0.163	132.909	91.687	10.491
14	0.546	0.196	0.204	0.146	114.139	122.051	12.427
15	0.575	0.188	0.188	0.2	115.041	96.829	16.08
16	0.679	0.258	0.188	0.233	122.06	96.708	14.477
17	0.65	0.325	0.125	0.2	137.271	76.513	13.471
18	0.629	0.246	0.196	0.188	137.439	107.198	15.696
19	0.479	0.175	0.158	0.146	69.063	70.208	9.652
20	1.025	0.742	0.117	0.167	125.816	85.43	11.577
Ave (2-20)	0.632 (sec)	0.244 (sec)	0.172 (sec)	0.216 (sec)	132.649 (mm/sec)	102.043 (mm/sec)	16.036 (mm)

**Table 1-3 Movement analysis of mouth opening-closing.**  
Subject A, Dentulous healthy subject  
Name: C  
Data classification: Free chewing

### 3. Mandibular jaw movement velocity

Higher velocity values exhibited in all cases of chewing with D2 in comparison with D1.

#### 1) Maximal velocity at mouth opening

Right-lateral chewing	D2<C<D1
Left-lateral chewing	C<D2<D1
Free chewing	D2<C<D1

#### 2) Maximal velocity at mouth closing

Right-lateral chewing	D2<C<D1
Left-lateral chewing	C<D2<D1
Free chewing	D2<C<D1

### 4. Masticatory rhythm and masticatory pattern

Higher stability behavior exhibited in case of masticatory rhythm with D2 in comparison with D1.

And in case of masticatory patterns, both D1 and D2 showed a grinding type of masticatory pattern, and cases of D1 indicated a pattern of slightly chopper type. C showed a chopping type.

## IV. Discussion

### 1. Experimental methodology

#### 1) Tested subjects

**Table 1-4 Movement analysis of mouth opening-closing.**  
Subject B, Wearing the complete mandibular denture without suction  
Name: D1  
Data classification: Right chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	4.279	1.296	2.704	0.279	53.091	101.977	13.511
2	0.821	0.233	0.363	0.225	71.974	85.646	14.542
3	0.854	0.217	0.333	0.304	116.281	99.114	17.509
4	0.871	0.192	0.354	0.325	88.601	96.101	19.42
5	0.938	0.204	0.375	0.358	107.659	92.07	21.009
6	0.792	0.246	0.167	0.379	86.498	92.534	10.871
7	0.875	0.258	0.379	0.238	79.852	84.308	17.29
8	0.996	0.213	0.371	0.413	97.692	91.56	20.139
9	0.879	0.15	0.421	0.308	85.736	37.875	13.795
10	0.746	0.121	0.354	0.271	69.127	103.776	15.815
Ave (2-10)	0.864 (sec)	0.204 (sec)	0.346 (sec)	0.313 (sec)	89.269 (mm/sec)	86.998 (mm/sec)	16.710 (mm)

**Table 1-5 Movement analysis of mouth opening-closing.**  
Subject B, Wearing the complete mandibular denture without suction  
Name: D1  
Data classification: Left chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.896	0.317	0.371	0.208	13.925	25.45	3.738
2	0.942	0.438	0.288	0.217	39.768	37.635	7.117
3	0.825	0.358	0.246	0.221	70.216	61.809	9.313
4	0.933	0.458	0.246	0.229	56.764	53.658	10.17
5	0.863	0.4	0.229	0.233	61.612	52.234	10.609
6	0.875	0.321	0.304	0.25	81.048	57.932	11.246
7	0.842	0.388	0.229	0.225	44.252	56.437	8.928
8	0.813	0.342	0.242	0.229	61.592	51.168	9.832
9	0.875	0.413	0.221	0.242	77.408	50.835	10.357
10	0.758	0.388	0.154	0.217	58.841	63.47	7.646
Ave (2-10)	0.858 (sec)	0.390 (sec)	0.240 (sec)	0.229 (sec)	61.278 (mm/sec)	53.909 (mm/sec)	9.469 (mm)

**Table 1-6 Movement analysis of mouth opening-closing.**  
Subject B, Wearing the complete mandibular denture without suction  
Name: D1  
Data classification: Free chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.658	0.163	0.358	0.138	34.044	69.934	6.068
2	0.708	0.208	0.213	0.288	70.102	39.28	8.503
3	0.746	0.275	0.233	0.238	86.702	62.698	11.159
4	0.746	0.229	0.204	0.313	62.024	51.45	8.552
5	0.767	0.379	0.175	0.213	66.09	46.423	6.987
6	0.679	0.242	0.225	0.213	58.922	60.36	9.973
7	0.833	0.292	0.246	0.296	78.451	63.741	10.161
8	0.654	0.183	0.225	0.246	95.445	52.674	10.059
9	0.771	0.267	0.258	0.246	56.501	68.561	11.051
10	0.721	0.225	0.275	0.221	63.724	80.01	11.587
11	0.717	0.221	0.238	0.258	78.72	60.294	12.37
12	0.738	0.275	0.233	0.229	94.389	56.347	10.496
13	0.675	0.25	0.2	0.225	98.34	56.778	11.908
14	0.733	0.225	0.238	0.271	114.62	72.426	13.456
15	0.75	0.333	0.213	0.204	63.063	57.897	10.11
16	0.675	0.242	0.213	0.221	75.13	55.448	11.22
17	0.654	0.267	0.192	0.196	98.708	86.091	12.016
18	0.733	0.275	0.225	0.233	84.255	63.672	13.094
19	0.633	0.233	0.183	0.217	112.942	68.418	12.456
20	0.675	0.25	0.175	0.25	125.283	64.174	12.991
Ave (2-20)	0.716 (sec)	0.256 (sec)	0.219 (sec)	0.241 (sec)	83.337 (mm/sec)	61.407 (mm/sec)	10.955 (mm)

Since variety of ages of subjects and experiences of denture wearing were reported to have an influence on their masticatory function<sup>14)</sup>, measurements in this study were made to use both the complete mandibular denture with suction and without suction in one same subject.

#### 2) Tested food material

Fish sausage is known for its uniform composition with less property change and is understood valid for comparative study of masticatory rhythm and pattern.

#### 3) Data analysis of Gnatho-Hexagraph II, mandibular jaw movement measuring device

As far as the edentulous subject B is concerned, analysis data

have been combined, in a strict sense, both with the mandibular jaw movement and with the complete mandibular denture mobility under the mucosal compression of denture bearing area of the residual ridge. So it needs to be remembered that measurement data is substantially different from that of precise mandibular jaw movement of the subject A.

But it may be understood that most likely results will be obtained.

### 2. Experimental results

In this case of maxillo-mandibular edentulous patient, nearly all measurement items were found varied throughout wearing the complete mandibular denture without suction and the

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	1.592	0.563	0.738	0.292	90.876	90.223	16.804
2	0.742	0.338	0.2	0.204	106.216	101.446	14.694
3	0.808	0.363	0.213	0.233	128.9	106.975	18.055
4	0.758	0.313	0.221	0.225	114.544	104.103	14.864
5	0.783	0.308	0.238	0.238	111.114	111.112	18.134
6	0.717	0.254	0.229	0.233	118.332	109.917	16.818
7	0.671	0.229	0.204	0.238	144.187	127.006	19.233
8	0.842	0.329	0.267	0.246	140.237	112.638	18.129
9	0.692	0.238	0.217	0.238	149.828	98.102	17.311
10	0.658	0.246	0.204	0.208	113.383	108.752	16.43
Ave (2-10)	0.741	0.291	0.221	0.229	125.193	108.895	17.074
	(sec)	(sec)	(sec)	(sec)	(mm/sec)	(mm/sec)	(mm)

Table 1-7 Movement analysis of mouth

opening-closing.  
Subject B, Wearing the complete mandibular denture with suction  
Name: D2  
Data classification: Right chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.829	0.213	0.379	0.238	57.296	101.498	15.347
2	0.792	0.363	0.233	0.196	93.479	98.904	14.858
3	0.8	0.317	0.229	0.254	107.404	101.367	17.619
4	0.696	0.258	0.221	0.217	112.942	95.992	13.963
5	0.679	0.213	0.225	0.242	140.387	116.107	16.261
6	0.75	0.254	0.267	0.229	110.355	118.845	18.619
7	0.654	0.208	0.221	0.225	90.888	90.834	12.788
8	0.75	0.283	0.221	0.246	114.654	97.513	14.93
9	0.729	0.275	0.213	0.242	86.17	83.382	14.324
10	0.692	0.279	0.183	0.229	126.743	93.98	15.469
Ave (2-10)	0.727	0.272	0.224	0.231	109.225	99.658	15.426
	(sec)	(sec)	(sec)	(sec)	(mm/sec)	(mm/sec)	(mm)

Table 1-8 Movement analysis of mouth

opening-closing.  
Subject B, Wearing the complete mandibular denture with suction  
Name: D2  
Data classification: Left chewing

Stroke	Opening-closing time	Occlusion time	Opening time	Closing time	Opening maximal velocity	Closing maximal velocity	Opening magnitude
1	0.888	0.279	0.413	0.196	72.675	152.883	18.707
2	0.646	0.267	0.188	0.192	165.634	129.317	16.746
3	0.679	0.279	0.183	0.217	154.145	106.441	16.466
4	0.792	0.275	0.242	0.275	147.801	110.131	19.6
5	0.658	0.238	0.196	0.225	114.059	127.833	18.025
6	0.7	0.258	0.204	0.238	160.339	112.728	17.284
7	0.667	0.283	0.167	0.217	124.445	105.257	16.527
8	0.65	0.229	0.192	0.229	102.886	81.066	15.427
9	0.608	0.263	0.129	0.217	131.867	81.043	12.747
10	0.738	0.313	0.183	0.242	138.837	96.577	16.591
11	0.6	0.217	0.204	0.179	178.304	139.424	18.79
12	0.788	0.454	0.15	0.183	171.331	140.439	17.584
13	0.613	0.242	0.183	0.188	143.831	109.683	16.814
14	0.625	0.271	0.15	0.204	143.596	87.163	13.211
15	0.663	0.288	0.167	0.208	143.309	122.51	16.388
16	0.704	0.292	0.188	0.225	154.266	93.12	15.366
17	0.658	0.208	0.246	0.204	111.493	122.827	17.695
18	0.704	0.308	0.192	0.204	133.636	91.366	13.655
19	0.65	0.242	0.188	0.221	136.598	128.543	17.269
20	0.767	0.308	0.208	0.25	109.072	89.561	15.639
Ave (2-10)	0.679	0.276	0.187	0.217	140.287	109.212	16.412
	(sec)	(sec)	(sec)	(sec)	(mm/sec)	(mm/sec)	(mm)

Table 1-9 Movement analysis of mouth

opening-closing.  
Subject B, Wearing the complete mandibular denture with suction  
Name: D2  
Data classification: Free chewing

complete mandibular denture with suction.

In this case of maxillo-mandibular edentulous patient, in comparison with wearing the complete mandibular denture without suction, all through the masticatory patterns of "right-lateral chewing", "left-lateral chewing" and "free chewing" of wearing the complete mandibular denture with suction exhibited time reduction of mouth opening-closing, enhanced magnitude of mouth opening, improvement of masticatory velocity, and stabilized masticatory rhythm. And because these data became close to those of the healthy dentulous subject, dynamic masticatory movement might be performed.

Meanwhile when wearing the complete mandibular denture

without suction, movement range was limited, closing motion took longer time and its velocity was delayed, showing a chopper type masticatory pattern. And so, in order to compensate the instability of the mandibular denture caused by pinching food bolus, it was assumed consequently that a slow and heavy jaw movement had dominated over in the vertical direction.

For a reason of shorter occlusion time at right-lateral chewing and free chewing when wearing the complete mandibular denture without suction, it may be related to low masticatory efficiency of the denture without suction, as it is reported that the rest time at the intercuspal position is likely to extend longer in the progress of mastication<sup>15)</sup>.

From this experimental study, it is suggested that wearing the complete mandibular denture with suction would be better effective in mastication than wearing the complete mandibular denture without suction.

Significant correlation was reportedly confirmed among aged patients between evaluation of denture performance and "dementia" or "degree of self-support"<sup>16)</sup>. 55% of patients in good performance of denture scores belonged to the group of "non-dementia", but only 25% of poor denture scores belonged to this group. In addition, 50% of patients in good scores were in the group of "self-support", but only 22% of poor denture scores were in this group.

The fact shows that a good quality denture significantly contributes to a patient's health and QOL.

Facing an era of super-aging society, therapy of removable denture will be demanded more highly<sup>17)</sup>, and good quality denture will have a profound effect on this society. Furthermore dentists will be also responsible for constructing good quality dentures.

Therefore, in a therapy of totally edentulous jaws, acquisition of techniques to construct a complete mandibular denture effective with suction onto the residual ridge should be indispensable in order to bring the Good News to edentulous patients.

## V. Conclusion

For maxillo-mandibular edentulous patients, in order to clarify the difference of masticatory movement of wearing the complete mandibular denture with suction or without suction respectively, same patient was instructed to chew same sort of test food and then the mandibular pathways and velocity were measured for comparative study, and the following conclusions were obtained.

1. As for the mouth opening-closing time in the masticatory movement, it was reduced when wearing the complete mandibular denture with suction in comparison with the complete mandibular denture without suction. But in some cases as far as only chewing time was concerned, contrary values were observed.

2. As for the magnitude of mouth opening while chewing, it was enhanced when wearing the complete mandibular denture with suction in comparison with the complete mandibular denture without suction.

3. As for the maximal velocity at mouth opening-closing, it showed higher values when wearing the complete mandibular denture with suction in comparison with the complete mandibular denture without suction.

4. As for the masticatory rhythm at masticatory movement, higher stability was shown when wearing the complete mandibular denture with suction in comparison with the complete mandibular denture without suction.

5. As for the masticatory pattern when wearing the complete mandibular dentures without suction or with suction respectively, both of them showed a grinding type, but wearing of the complete mandibular denture without suction tended to be a pattern of slightly chopper type.

As above, in the same maxillo-mandibular edentulous patient, the masticatory movement of wearing the complete mandibular denture without suction or with suction respectively showed apparent differences, and it was confirmed that the movement of wearing the complete mandibular denture with suction resembled that of healthy dentulous control.

Now therefore the masticatory movement when wearing the complete mandibular denture with suction is attained on more physiological and smooth performance, and in our super-aging society, acquisition of constructing denture suction technique for the complete mandibular denture should be essential to dentists.

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